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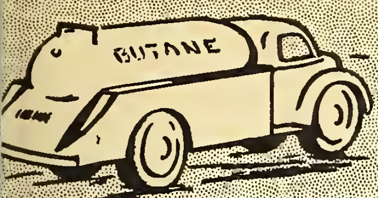
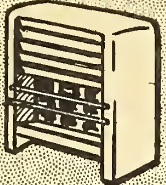
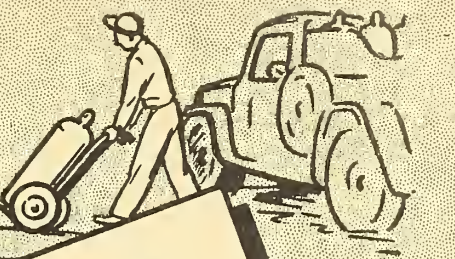
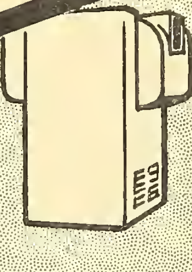
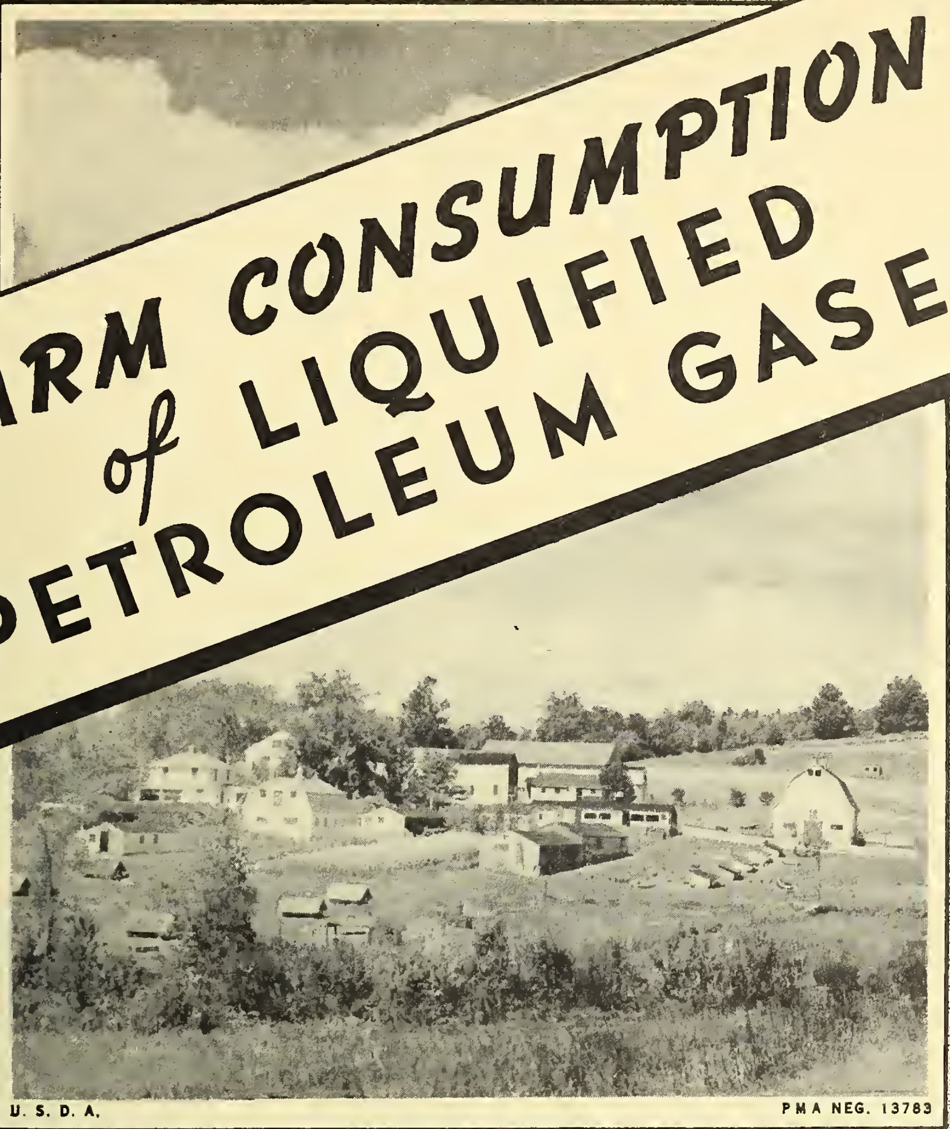






FARM CONSUMPTION of LIQUIFIED PETROLEUM GASES

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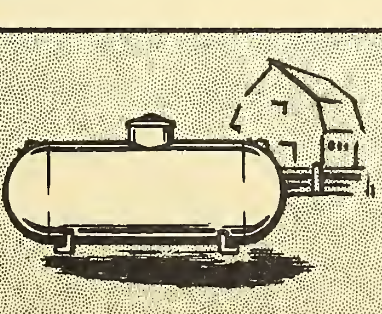

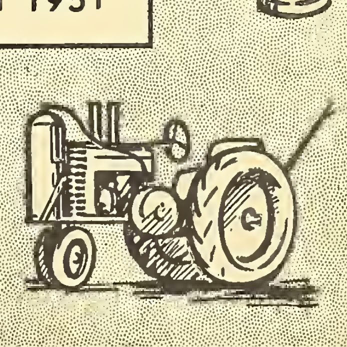

SOURCE OF MATERIAL

This report contains estimates of the quantity and the price paid by farmers for liquefied petroleum gases used on their farms in 1949. The estimates are based on reports obtained in February 1950 from about 6,000 voluntary crop reporters who used liquefied petroleum gas on their farms in 1949. They reported the quantity of LP-gas used in their farm households, for other farm uses, and the total cost of the LP-gas used on their farm in 1949. Also, they reported the size of their farm.

Information from the crop correspondents was tabulated by seven size-of-farm groups within each State. The estimates by size-of-farm group were weighted by appropriate weights from Census reports to derive State estimates. It is believed that this procedure eliminated a substantial part of the bias resulting from the fact that the farms included in the survey were in general of above average size. Even so, estimates, by States, should be considered only as approximations.

FARM CONSUMPTION OF LIQUEFIED PETROLEUM GASES

By Albert P. Brodell, Agricultural Economist
and
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PRELIMINARY

Liquefied petroleum gases (LP-gases) have been used on farms for 15 or more years, but it is only in recent years that their use on farms has become important. The LP-gases consist principally of propane and butane and mixtures of these gases. Under normal weather conditions these gases are liquid only under pressure. Propane gassifies at temperatures above -44° F. and butane at temperatures above 32° F. For this reason propane and propane mixtures are used in the more northern areas while use of butane is important in the South.

The LP-gases are by-products of the petroleum industry. They come from natural gas plants and from petroleum refineries. In many sections of the country practically all of the LP-gas is sold by the pound, and usually delivered to farmers in containers of 200-pound capacity and less. "Bottles" or "cylinders" of 100-pound capacity are the most common size used on farms. In these areas LP-gas is often called "bottle gas," "cylinder gas" or designated by one of various trade names. In areas of the country where liquefied petroleum gases are sold by the gallon they are usually sold as propane or butane.

TOTAL SALES

Sales of LP-gas in 1950 are estimated by the U. S. Bureau of Mines at 3,575,000,000 gallons (table 1). This is about 200 times as much as was sold in 1930. From 1930 to 1940 sales increased by about 1,600 percent. The 1950 volume of sales was about three times that of 1945. In 1949, propane alone accounted for about half of the total sales. In recent years, propane sales have increased more rapidly than have total sales while sales of butane have not kept pace with total sales. All other LP-gases, consisting largely of butane-propane mixtures, have accounted for more than a third of the total sales since 1940. Liquefied petroleum gases are widely used in industry, and for household purposes in areas beyond city gas mains.

Table 1.- Total sales of liquefied petroleum gases in the United States, 1930-1950 1/

Year	Propane	Butane	All other 2/	Total
	1,000 gallons	1,000 gallons	1,000 gallons	1,000 gallons
1930	11,500	3/	6,500	18,000
1935	26,800	34,100	16,000	76,900
1940	109,200	77,100	127,200	313,500
1945	444,581	325,140	507,045	1,276,766
1946	551,250	441,418	711,594	1,704,262
1947	863,686	398,635	947,476	2,209,797
1948	1,279,744	512,615	944,442	2,736,801
1949	1,403,359	488,801	944,439	2,836,599
1950 4/				3,575,000

1/ U. S. Bureau of Mines, Department of Interior.

2/ Principally butane--propane mixtures but includes small quantities of other LP-gases.

3/ Included with all other.

4/ Preliminary estimate.

USE OF LIQUEFIED PETROLEUM GASES

The reports from the crop correspondents do not provide complete details concerning the farm use of LP-gases. Of the farmers who used LP-gas in 1949, about 90 percent used it only in the farm household, 7 percent for both household and other farm uses, and 3 percent for farm uses other than in the farm household (table 2).

Table 2.- Percentage distribution of farms using LP-gas by major uses, State groups, 1949

State group	Farms using LP - gas		Percentage of farms using LP-gas for -		
	Total farms	Farms in study	Household only	Other farm uses	Household and other
	Thousands	Number	Percent	Percent	Percent
Northeast	86	432	90	4	6
Corn Belt	267	1,114	93	2	5
Lake States	140	714	94	3	3
Great Plains	138	1,249	92	2	6
Appalachian	88	277	89	2	9
Southeast	60	211	86	8	6
Delta	129	436	92	3	5
Oklahoma-Texas	206	874	85	3	12
Mountain	49	374	89	3	8
Pacific	67	306	79	8	13
United States	1,230	5,987	90	3	7

On farms where LP-gas is used for other farm uses, consumption per farm tends to be large. Thus, in 1949, only 10 percent of the farms reported using LP-gas for nonhousehold purposes but these farms accounted for 25 percent of the total consumption (table 3).

In all areas of the country, the percentage of the consumption accounted for by all other farm uses exceeded the percentages of farms reporting that use. More than 40 percent of the LP-gas used on farms in the Pacific Coast States was utilized for nonhousehold purposes as was about one-third of the consumption of Oklahoma and Texas. In the Corn Belt, Lake, Plains and Delta States, about 90 percent of the LP-gas was used in the farm household.

In the farm household, LP-gas is widely used as a fuel for cooking, for heating water, and for gas refrigerators. Use of LP-gas for heating homes is confined largely to the areas in which it is sold by the gallon and in which prices compare favorably with prices of fuel oil. LP-gas has many nonhousehold uses on the farm. Major uses are as a motor fuel, especially for tractors and large stationary engines, for brooding chickens, and for dehydrating crops. In some States large quantities of LP-gases are utilized for pumping irrigation water.

Table 3.- Consumption of liquefied petroleum gases by State groups, and by size of farms, United States, 1949

State group	Using LP-gas: Percentage of all farms	Using LP-gas: Consumption per farm	Percentage used in -: Farm household	Percentage used in -: All other farm uses
	Percent	Gallons	Percent	Percent
Northeast	19	128	85	15
Corn Belt	27	179	90	10
Lake States	28	129	90	10
Great Plains	37	469	89	11
Appalachian	9	206	83	17
Southeast	10	329	79	21
Delta	23	433	89	11
Oklahoma-Texas	43	821	68	32
Mountain	25	681	77	23
Pacific	25	1,042	58	42
United States				
Under 50 acres	17	251	96	4
50 - 99 acres	19	272	86	14
100 - 179 acres	24	342	81	19
180 - 259 acres	27	380	76	24
260 - 499 acres	34	609	61	39
500 acres and over	46	972	68	32
Average size of farm	23	413	75	25

FARM CONSUMPTION

Total farm consumption of liquid petroleum gases was estimated at more than a half-billion gallons in 1949 (table 4). This was about 18 percent of the total sales of the country (table 1). Total sales in 1950 were more than 25 percent above 1949 sales. If farm consumption increased in the same proportion as total sales it approximated 640 million gallons in 1950. There are indications that use of LP-gas as a tractor fuel has increased materially since 1949. Sales of conversion units for adapting tractors designed for other fuels to the use of LP-gas are reported to be increasing. Then, too, several manufacturers now offer farm tractors designed for using LP-gas. Use of LP-gas for brooding chickens also is reported to be increasing rapidly.

Farm use of LP-gas was reported in every State. Four States, Texas, California, Oklahoma, and Kansas, together accounted for more than half of the total consumption of 1949 (table 4). Large quantities were also used in each of the Delta States and in Nebraska and in Missouri.

Table 4.- Farm consumption and prices paid by farmers for liquefied petroleum gases by principal consuming States, and State groups, 1949

State and group	Used on farms	Percentage of users buying by the -		Percentage bought by the -		Prices paid -		Cost per gallon, all purchases 2/
		Pound 1/	Gallon	Pound 1/	Gallon	Per pound	Per gallon	
	1,000 gallons	Per-cent	Per-cent	Per-cent	Per-cent	Cents	Cents	Cents
Northeast	10,900	99	1	97	3	9.3	20.0	41.1
Ohio	4,375	98	2	92	8	8.5	17.0	36.5
Indiana	3,875	98	2	92	8	8.0	16.5	34.5
Illinois	7,575	91	9	72	28	8.5	15.0	31.5
Iowa	11,525	95	5	72	28	8.0	16.0	30.5
Missouri	20,500	63	37	19	81	7.0	12.0	15.5
Corn Belt	47,850	88	12	53	47	8.0	13.3	25.1
Lake States	18,000	97	3	86	14	7.9	17.5	33.0
North Dakota	5,650	88	12	61	39	7.5	15.5	26.5
South Dakota	9,050	72	28	33	67	7.0	14.0	20.0
Nebraska	16,000	59	41	18	82	7.0	12.5	16.0
Kansas	34,200	20	80	5	95	6.0	11.0	12.0
Great Plains	64,900	55	45	17	83	7.0	11.9	15.4
Appalachian	18,200	76	24	39	61	8.9	16.9	25.9
Southeast	19,950	37	63	13	87	8.3	15.9	18.7
Mississippi	17,850	4	96	3	97	7.0	13.0	13.5
Louisiana	18,650	2	98	1	99	7.0	13.5	13.5
Arkansas	19,300	5	95	2	98	6.0	11.5	12.0
Delta	55,800	4	96	2	98	6.6	12.6	12.9
Oklahoma	36,950	5	95	1	99	4.0	10.0	10.0
Texas	132,250	1	99	1	99	3.5	9.5	9.5
Okla.-Texas	169,200	2	98	1	99	3.7	9.6	9.7
Mountain	33,700	36	64	8	92	6.9	14.1	15.4
Washington	3,650	70	30	29	71	9.5	20.0	26.5
Oregon	2,900	25	75	5	95	9.5	20.0	21.0
California	63,500	21	79	7	93	6.0	14.0	15.0
Pacific	70,050	27	73	8	92	6.8	14.5	15.8
United States	508,550	54	46	16	84	7.9	12.0	15.8

1/ Includes small quantities of metered LP-gas.

2/ In computing this figure 4.5 pounds of LP-gas were used as the equivalent of one gallon.

The LP-gases were used on about 1,230,000 farms. On more than 55 percent of these farms, less than 250 gallons were consumed per farm (table 5). Eighty-seven percent of the farms used less than 1,000 gallons per farm. On farms where less than 250 gallons were used, it is probable that practically all of the LP-gas was used in the farm kitchen. On most farms where large quantities of LP-gas were used, much of it was used either as a heating fuel or for other than household uses.

Consumption per farm of LP-gas tended to increase as farm size increases (table 3). Also, on the larger farms an above-average percentage of the LP-gas was used for other than household uses.

PRICES PAID BY FARMERS

Prices paid by farmers for LP-gas varied widely in 1949 (table 4). In areas of heavy farm consumption most of the LP-gas was bought by the gallon, delivered to the farm by tank trucks, and stored in tanks owned by the farmer. Prices paid per gallon by individual farmers in 1949 varied from about 7 to about 25 cents per gallon. Prices in Texas were lower than in any other State. In Oklahoma, the Delta States, Missouri, most Plains States, California, and the Southern Mountain States, prices were below the U. S. average.

More than half of the farmers who used LP-gas bought it by the pound, but their purchases accounted for only about one-sixth of the LP-gas used on farms.

It takes about 4.5 pounds of LP-gas to be the equivalent of a gallon. Converting total pounds purchased into equivalent gallons provides a method of estimating actual prices paid by farmers for the same quantity of LP-gas.

Cost to farmers for all purchases of LP-gas ranged from about 41 cents per gallon in the Northeastern States to less than 10 cents per gallon in Oklahoma and Texas. For LP-gas bought by the pound, the average price was 7.9 cents per pound, which was equivalent to about 35 cents per gallon. For LP-gas bought by the gallon the average price was 12 cents. The average cost to farmers for all purchases was 15.8 cents per gallon.

Table 5.- Percentage distribution of farms using liquefied petroleum gases, by quantity used, principal States, and State groups, 1949

State and group	Total farms 1950 1/	Using LP-gas: Percentage of all farms	Using LP-gas: Consumption per farm	Percentage of farms using - Less than 100 gallons	100 - 249 gallons	250 - 499 gallons	500 - 999 gallons	1,000 - 1,999 gallons	2,000 and over gallons
	Number	Percent	Gallons	Percent	Percent	Percent	Percent	Percent	Percent
Northeast	443,408	19	128	54	35	8	2	1	-
Ohio	199,303	16	137	46	44	8	1	1	-
Indiana	166,633	23	101	56	39	3	1	1	-
Illinois	195,246	30	129	56	32	5	2	4	1
Iowa	203,189	41	138	57	33	6	2	1	1
Missouri	230,040	24	370	28	36	16	12	6	2
Corn Belt	994,411	27	179	49	35	8	4	3	1
Lake States	503,268	28	129	53	38	6	2	1	-
North Dakota	65,354	42	206	31	50	13	3	2	1
South Dakota	66,437	48	284	34	36	14	8	7	1
Nebraska	107,255	32	466	30	26	14	12	14	4
Kansas	131,382	34	766	7	17	13	24	30	9
Great Plains	370,428	37	469	24	30	14	13	15	4
Appalachian	968,602	9	206	40	38	8	9	4	1
Southeast	605,386	10	329	24	27	20	20	6	3
Mississippi	251,378	18	394	8	11	33	30	15	3
Louisiana	124,141	38	395	7	18	34	36	4	1
Arkansas	182,416	20	529	3	20	26	33	14	4
Delta	557,935	23	433	6	16	32	33	11	2
Oklahoma	142,253	40	649	3	11	17	40	26	3
Texas	331,494	45	886	3	11	25	37	14	10
Okla.-Texas	473,747	43	821	3	11	23	38	17	8
Mountain	194,582	25	681	15	21	19	22	17	6
Washington	69,809	12	434	26	30	12	20	6	6
Oregon	59,802	9	541	15	17	26	22	16	4
California	137,137	39	1,188	7	21	14	22	16	20
Pacific	266,748	25	1,042	10	21	15	22	15	17
United States	5,379,015	23	413	29	27	15	16	9	4

1/ Preliminary, 1950 Census of Agriculture.

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